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EXAMINER	
HUBER, ROBERT T	

ART UNIT	PAPER NUMBER
2892	

NOTIFICATION DATE	DELIVERY MODE
01/21/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PATDOCTC@fr.com

Office Action Summary	Application No.	Applicant(s)	
	10/578,960	MINIXHOFER, RAINER	
	Examiner	Art Unit	
	ROBERT HUBER	2892	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _14 November 2008_.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1,3-8 and 10-20_ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1,3-8,10-20_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on November 14, 2008 has been entered.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 3 – 8, 10 – 14, and 16 – 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lehovec (US 3,569,997, prior art of record) in view of Iwasaki (US 7,129,466 B2, prior art of record).

a. Regarding claims 1 and 18, **Lehovec discloses an optoelectronic component and method of using** (e.g. figure 5) **comprising:**

a semiconductor device (device including active regions 41 and 43, with electrodes 44 and 45) **comprising a radiation-sensitive zone that is formed in silicon and configured to detect electromagnetic radiation** (zone 42,

disclosed col. 4, line 17, which is formed in the silicon substrate 41, disclosed col. 4, line 50),

an optical element configured to focus the electromagnetic radiation in the radiation-sensitive zones (optical element on layer 40 with regions 2, 4, 5, 6 and 7), **the optical element comprising a zone plate having structures with sizes on an order of magnitude of a wavelength of the electromagnetic radiation** (col. 4, lines 5 – 8, disclose the element to be a zone plate, as well as the opaque and transparent regions. Col. 3, lines 37 - 39 and figure 3 show that distance between adjacent regions of the zone plate is on the order of a wavelength), **and**

Lehovec is silent with respect to the radiation sensitive zone having multiple radiation sensitive zones, and wherein the radiation-sensitive zones are at varying distances from the optical element such that radiation-sensitive zones configured to detect shorter wavelengths of the electromagnetic radiation are at greater distances from the optical element compared to radiation-sensitive zones configured to detect longer wavelengths of the electromagnetic radiation. Lehovec does show that there is a radiation sensitive zone at a distance away from an optical element (as seen in figure 5).

Iwasaki discloses a photosensitive element (e.g. figures 5A – 5E) **which comprises multiple radiation sensitive zones** (zones denoted R,G,B, as disclosed in col. 7, lines 35 – 41, col. 8, lines 8 - 12, and col. 5, lines 43 - 45),

which are configured to detect shorter wavelengths of the electromagnetic radiation are at greater distances from a light source element compared to radiation-sensitive zones configured to detect longer wavelengths of the electromagnetic radiation (e.g. as seen in figure 5D, the B zone detects blue light, which has a shorter wavelength and is at a greater distance away from the light source than the R zone, which detects longer wavelengths).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the radiation sensitive zone of Lehovec to include multiple, stacked radiation sensitive zones such that radiation-sensitive zones configured to detect shorter wavelengths of the electromagnetic radiation are disposed at greater distances from the optical element compared to radiation-sensitive zones configured to detect longer wavelengths of the electromagnetic radiation, since Lehovec discloses a device with a radiation sensitive zone, and Iwasaki discloses that a radiation sensitive device may comprise multiple, stacked radiation sensitive zones, which are configured to detect shorter wavelengths of the electromagnetic radiation are at greater distances from a light source element compared to radiation-sensitive zones configured to detect longer wavelengths of the electromagnetic radiation.

The combination of the radiation sensitive zones of Iwasaki with the device of Lehovec would yield a structure such that the radiation-sensitive zones are at varying distances from the optical element such that radiation-

sensitive zones configured to detect shorter wavelengths of the electromagnetic radiation are at greater distances from the optical element compared to radiation-sensitive zones configured to detect longer wavelengths of the electromagnetic radiation, since Iwasaki discloses a direction of a light source on the radiation zones (i.e. the arrow in figure 5D), **and Lehovec discloses the direction of light onto the radiation zone from the zone plate** (i.e. the arrows in figure 5)

One would have been motivated to make such a modification to combine the teachings of both references since it is well known in the art that optical elements will have diffraction focal lengths that are different for different wavelengths of light, and therefore stacked sensors detecting different wavelengths would allow one to more effectively detect discrete bandwidths of certain wavelengths (e.g. red, green, and blue).

b. Regarding claim 3, **Lehovec in view of Iwasaki further disclose the optoelectronic component of claim 1, as cited above, where the zone plate is incorporated into the semiconductor device** (e.g. as shown in figure 5 of Lehovec).

c. Regarding claim 4, **Lehovec in view of Iwasaki further disclose the optoelectronic component of claim 1, wherein at least one of the radiation-sensitive zones is configured to detect electromagnetic radiation having a**

wavelength between about 100 nm and about 5 microns (Iwasaki discloses the radiation sensitive zones R, G, and B are configured to detect light between about 400 nm and over 600 nm, as disclosed in col. 6, lines 40 - 44).

d. Regarding claim 5, **Lehovec in view of Iwasaki further disclose the optoelectronic component of claim 4, wherein at least one of the radiation-sensitive zones is configured to detect electromagnetic radiation in the visible spectral region having a wavelength from about 400nm to about 800 nm** (Iwasaki discloses that the green G radiation sensitive zone can detect light between 500 nm and 600 nm. Furthermore, it has been held that when the prior art discloses the general conditions of the claimed invention, discovering the optimum or workable ranges involves only ordinary skill in the art. See MPEP 2144.05).

e. Regarding claim 6, **Lehovec in view of Iwasaki further disclose the optoelectronic component of claim 1, wherein a distance between the zone plate and at least one of the radiation-sensitive zones is less than about 20 microns** (Lehovec: col. 8, lines 34 - 35 disclose the distance between the zone plate and the first radiation sensitive zone is 4 microns, which is the thickness of layer 40 of figure 5)

f. Regarding claim 7, **Lehovec in view of Iwasaki further disclose the optoelectronic component of claim 1, as cited above, wherein:**

a first one of the radiation-sensitive zones is configured to detect radiation with a wavelength lambda (λ) (Iwasaki: col. 7, lines 35 – 41, and col. 6, lines 40 – 44, disclose the radiation-sensitive zones to detect radiation with wavelengths); **and**

the zone plate is at a distance R from the first one of the radiation-sensitive zone and has a diameter D, wherein for a Fresnel number F of the zone plate: $F = (D^2/\lambda R) > 1$ (Lehovec: col. 8, lines 34 - 35 disclose the distance of the zone plate from the first radiation-sensitive zone to be the thickness of the layer 40, which is 4 microns. Outer region 7 defines the diameter, as disclosed in col. 3, line 12, and seen in figure 5. Figure 3 shows that the radius of the zone plate is greater than $10\lambda/4$, and hence the diameter is greater than $20\lambda/4$. Lehovec discloses in column 8, lines 25 – 45, that the distance R = 4 microns. Iwasaki discloses that λ~ 500nm. Therefore, the zone plate has a Fresnel number of $F = (D^2/\lambda R) = (20*1/4)^2/(.5*4) = 3.125 > 1$).

g. Regarding claim 8, **Lehovec in view of Iwasaki further disclose optoelectronic component of claim 7, as cited above, wherein a focal length of the zone plate for radiation with wavelength of about 550 nm is from about 1 micron to about 20 microns** (Lehovec: the focal length for a zone plate $r_n \approx \sqrt{n\lambda f}$, where n = the number of quarter wavelengths to the edge of the

plate, and r_n is the radius to the nth quarter wavelength. As cited above, there are 10 quarter wavelengths to the edge, and the radius is greater than $10\lambda/4$, as seen in figure 3. Therefore, for $\lambda \sim 0.550$ microns, the focal length is 3.75 microns).

h. Regarding claim 10, **Lehovec and Iwasaki disclose the optoelectronic component of claim 1, as cited above, wherein the radiation-sensitive zone is in a corresponding focal plane of the zone plate** (e.g. Lehovec discloses in col. 4, lines 20 - 21, that the incoming light is focused to point 42 of the radiation-sensitive zone). **Lehovec is silent with respect to the multiple radiation-sensitive zones and corresponding colors. However, Iwasaki discloses the multiple radiation sensitive zone and corresponding colors** (e.g. col. 6, lines 36 – 45, and col. 7, lines 35 – 41, with reference to figures 5A – 5E).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to combine the teachings of Lehovec and Iwasaki such that each corresponding radiation-sensitive zone has a focal plane of the corresponding wavelength form the diffraction element. One would be motivated to make such a combination because it would allow for the most efficient light absorption in the zone if all of the corresponding light was focused in its corresponding radiation sensitive zone.

i. Regarding claims 11 and 19, **Lehovec in view of Iwasaki further disclose the optoelectronic component of claim 10 and method of claim 18, as cited above respectively, wherein the radiation-sensitive zones are in a corresponding focal plane of the zone plate** (Lehovec: figure 5D shows a radiation sensitive zone in a corresponding focal plane):

a first radiation-sensitive zone in a focal plane of the zone plate for wavelengths associated with red visible light (Iwasaki: as seen in the figure, the topmost zone is for red light);

a second radiation-sensitive zone in a focal plane of the zone plate for wavelengths associated with green visible light (Iwasaki: as seen in the figure, the middle zone is for green light); and

a third radiation-sensitive zone in a focal plane of the zone plate for wavelengths associated with blue visible light (as seen in the figure, the bottommost zone is for blue light).

Lehovec is silent with respect to the multiple radiation-sensitive zones and corresponding colors. However, Iwasaki discloses the multiple radiation sensitive zone and corresponding colors (e.g. col. 6, lines 36 – 45, and col. 7, lines 35 – 41, with reference to figures 5A – 5E).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to combine the teachings of Lehovec and Iwasaki such that each corresponding radiation-sensitive zone has a focal plane of the corresponding wavelength form the diffraction element. One would be motivated

to make such a combination because it would allow for the most efficient light absorption in the zone if all of the corresponding light was focused in its corresponding radiation sensitive zone.

j. Regarding claim 12, **Lehovec in view of Iwasaki further discloses the optoelectronic component of claim 1, wherein the zone plate comprises a layer included in the semiconductor device** (Lehovec: as seen in figure 5, with respect to figure 1, that the zone plate comprises a layer and is in the semiconductor device of figure 5).

k. Regarding claim 13, **Lehovec in view of Iwasaki disclose the optoelectronic component of claim 1, as cited above, but are silent with respect to the layer comprising a metallic layer. Lehovec discloses that the zone plate should be made of opaque and transparent layers** (col. 3, lines 9 – 10).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to use metal as the opaque layer in the zone plate since it is well-known that metals are mostly opaque materials. Furthermore, it has been held that selection of a prior art material on the basis of its suitability for its intended purpose is within the level of ordinary skill. See MPEP 2144.07. One would have been motivated to have a zone plate that comprises a metallic layer

since metal is durable, malleable, and opaque, which would allow one to manufacture the zone plate easily.

l. Regarding claim 14, **Lehovec in view of Iwasaki further disclose the optoelectronic component of claim 1, as cited above, wherein the zone plate of comprises a first transparent material having an index of refraction (n_1) and a second transparent material having an index of refraction (n_2), n_1 being different than n_2** (Lehovec: col. 3, line 35 discloses the transparent material with index of refraction n, and col. 3, line49 - 50 disclose a second transparent material with index of refraction n').

Although Lehovec does not explicitly disclose that n and n' are different, it would have been obvious for one of ordinary skill in the art at the time the invention was made to have the indices of refraction to be different, since a zone plate requires the indices of refraction of the zone plate layers (rings) to be different in order to work. One would have been motivated to have the indices to be different since the zone plate must have the indices n and n’ different in order to operate as a diffraction grating, and the plate would simply be a transparent plate without diffraction properties if they were not different.

m. Regarding claim 16, **Lehovec in view of Iwasaki further disclose optoelectronic component of claim 1, wherein the zone plate comprises a**

structured layer included in the semiconductor device (Lehovec:. as seen in figures 1 and 5, the zone plate comprises a structured layer).

n. Regarding claim 17, **Lehovec in view of Iwasaki further disclose the optoelectronic component of claim 16, as cited above, wherein the semiconductor device comprises an integrated circuit** (Lehovec: the radiation sensitive zones may comprise PN junctions, which is an integrated circuit, as shown in figure 5).

o. Regarding claim 20, **Lehovec in view of Iwasaki further disclose the optoelectronic component of claim 1, wherein the semiconductor device comprises a semiconductor chip** (col. 4, lines 10 - 14 discloses regions of the radiation sensitive zone PN junction to be formed in a semiconductor wafer and may comprise a solar cell, which can be considered a semiconductor chip).

4. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lehovec in view of Iwasaki as applied to claim 14 above, and further in view of Fedotowsky (US 3,763,272, prior art of record). **Lehovec in view of Iwasaki disclose the optoelectronic component of claim 14, as cited above, but are silent with respect to the first transparent material comprises a silicon oxide and the second transparent material comprises a silicon nitride.**

Fedotowsky discloses (e.g. in col. 4, lines 25 – 28), **that a silicon nitride (Si_3N_4), antireflective coating may be formed on a SiO_2 zone plate** (e.g. as seen in figure 13, and col. 8, lines 14 - 24 discloses the process of making such a coating). **The steps of forming the coating involve oxidizing the silicon substrate, then removing part of the oxidized layer, then re-oxidizing for form another separate layer** (e.g. as seen in figure 13, the thin and thick layers of silicon oxide on the silicon substrate).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the zone plate of the device of Lehovec in view of Iwasaki such that it comprises a layer of a silicon oxide and a layer of silicon nitride, since Fedotowsky states that a silicon nitride may be used to coat silicon oxide zone plates. Furthermore, it has been held by the courts that selection of a prior art material on the basis of its suitability for its intended purpose is within the level of ordinary skill. See MPEP 2144.07. One would be motivated to use a coating with a combination of silicon oxide and silicon nitride layers since it would alter the diffraction and anti-reflection properties of the zone plate, and allow one to adjust the patterns to yield desirable effects.

Response to Arguments

5. Applicant's arguments filed on November 14, 2008 have been fully considered but they are not persuasive. At present, the prior art of Lehovec in view of Iwasaki remains commensurate to the scope of the claims as stated by the Applicant within the

context of the claim language and as broadly interpreted by the Examiner [MPEP 2111], which is elucidated and expounded upon above. In response to Applicants arguments drawn to the amendment, "*radiation-sensitive zones that are formed in silicon*", the prior art of Lehovec discloses a radiation zone that is formed in a silicon substrate, as discussed above with respect to claims 1 and 18. Lehovec only discloses one radiation sensitive zone, however the prior art of Iwasaki discloses that multiple radiation-sensitive zones may be formed and configured to detect shorter wavelengths at great distances from a light source. Iwasaki also discloses, as pointed out by the Applicant in the remarks filed on November 14, 2008, that multiple radiation-sensitive zones may be formed in silicon, as disclosed in col. 7, line 61 - col. 8, line 10 of Iwasaki. Although Iwasaki discloses that one or more of the zones may be formed in an organic material, Iwasaki also discloses that one or more of the zones may be formed in silicon.

Furthermore, the examiner submits that the combination of that the multiple radiation-sensitive zones formed and configured to detect shorter wavelength at a greater distance from the light source as taught by Iwasaki does not change the principle of operation of the primary reference or render the reference inoperable for its intended purpose. See MPEP § 2143.01. The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference, rather, the test is what the combined teachings of those references would have suggested to those of ordinary skill in the art. In re Keller, 642 F.2d 413, 425, 208 USPQ 871, 881 (CCPA 1981). See also In re Sneed, 710 F.2d 1544, 1550, 218 USPQ 385, 389 (Fed. Cir. 1983). A person of ordinary skill in the art is capable of

understanding the scientific and engineering principles applicable to the pertinent art, and will be able to fit the teachings of multiple patents together. See MPEP 2141.03. Although the Lehovec reference does not explicitly disclose *multiple* radiation-sensitive zones configured to detect shorter wavelengths at greater distances from the optical element, the Lehovec reference does disclose a single radiation-sensitive zone formed in silicon. The Iwasaki reference discloses that multiple-radiations sensitive zones may be formed and configured to detect shorter wavelengths at greater distances from a light source, as well as disclosing that multiple radiation-sensitive zones may be formed in silicon. It is submitted that one of ordinary skill in the art, as defined in MPEP 2141.03, could have combined the teachings of Lehovec and Iwasaki to create the claimed invention.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ROBERT HUBER whose telephone number is (571)270-3899. The examiner can normally be reached on Monday - Thursday (9am - 6pm EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thao Le can be reached on (571) 272-1708. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Thao X Le/
Supervisory Patent Examiner, Art Unit 2892

/Robert Huber/
Examiner, Art Unit 2892
January 7, 2009